



First record of *Conura morleyi* (Ashmead, 1904) (Hymenoptera: Chalcididae) parasitizing *Brassolis* sp. (Lepidoptera: Nymphalidae) for Mato Grosso do Sul, Brazil

Mariáh Tibcherani^{1*}, Rodrigo Aranda² and Ramon Luciano Mello¹

1 Universidade Federal de Mato Grosso do Sul, Centro de Ciências Biológicas e da Saúde, Laboratório de Sistemática de Díptera, Cidade Universitária, CEP 79070-900, Campo Grande, MS, Brazil

2 Universidade Federal de Mato Grosso do Sul, Curso de Ciências Biológicas, Oscar Trindade de Barros - Unidade II, CEP 79200-000, Aquidauana, MS, Brazil

* Corresponding author. E-mail: mariah.biologia@gmail.com

Abstract: We report the first record of *Conura morleyi* (Hymenoptera: Chalcididae) parasitizing pupae of *Brassolis* sp. (Lepidoptera: Nymphalidae) in the state of Mato Grosso do Sul, Brazil. Fifty-four individuals of *C. morleyi* emerged from two pupae of *Brassolis* collected in an urban area of Campo Grande. With our new record, the genus *Conura* is now represented in the state of Mato Grosso do Sul by 15 species. Our record of *C. morleyi* in Mato Grosso do Sul represents a range extension for this species.

Key words: Brazilian savanna; Cerrado; parasitoid; Neotropics; Chalcidinae

The Chalcididae have a current worldwide distribution of 1,464 species in 87 genera (Noyes 2016), and five subfamilies (Chalcidinae, Dirhininae, Epitraninae, and Haltichellinae) (Boucek 1992). The Neotropical fauna is represented by 217 species in 21 genera (Delvare and Arias-Penna 2006). They are known by their parasitoid or hyperparasitoid behavior, in which the females lay eggs in larvae or pupae of several other insect groups such as dipterans, lepidopterans, hymenopterans, and coleopterans.

The subfamily Chalcidinae has four tribes, among them the Chalcidini, which is represented in the Neotropical region by six genera, including *Conura* Spinola, 1837. This genus currently is composed of 305 species (Noyes 2016) with worldwide distribution (IMSA 2015).

Conura generally seek pupae of lepidopterans as their hosts; however, some species attack hymenopterans, coleopterans, and dipterans, or become hyperparasitoids of other parasitoids such as Braconidae and Ichneumonidae of the order Hymenoptera (Mariau 2001).

Records show that are hosts for *Conura* include the Chrysomelidae (Coleoptera) (Montes and Costa 2011), Syrphidae and Muscidae (Diptera) (Marchiori et al. 2004; Couri et al. 2006), Braconidae (Hymenoptera) (Sakazaki et al. 2011), as well as Gelechiidae and Nymphalidae (Lepidoptera) (Marchiori et al. 2004; Marciano et al. 2007).

Fourteen species of *Conura* were previously recorded in the state of Mato Grosso do Sul, but *C. morleyi* has not been recorded (Shimbori et al. in press).

We present the first known occurrence of *Conura (Spilochalcis) morleyi* (Ashmead, 1904) in the state of Mato Grosso do Sul, Brazil.

Pupae from two specimens of *Brassolis* sp. (Lepidoptera: Nymphalidae) were collected in a residential area of Campo Grande, Mato Grosso do Sul, Brazil (20°28' S, 054°37' W). The region has a subtropical climate with a well-defined dry season from May to September. The mean annual rainfall is 1,125 mm and the average of minimum and maximum annual temperatures are 17°C and 29°C, respectively.

We transported the pupae to the Laboratório de Sistemática de Díptera of the Universidade Federal de Mato Grosso do Sul (LSD/UFMS) in September 2014. They were stored in transparent bottles and kept under ambient conditions until the emergence of adult parasitoids.

The parasitoids and hosts analyzed were deposited in the Coleção Zoológica da Universidade Federal de Mato Grosso do Sul (ZUFMS), Campo Grande, Brazil and in the Coleção Entomológica do Departamento de Ciências Biológicas da Universidade Federal do Espírito Santo (UFES), Vitória, Brazil.

Specimens examined: BRAZIL, MATO GROSSO DO SUL, Campo Grande, 23/IX/2014, 5 males, 35 females and 8 unidentified (ZUFMS), under the numbers HYM00296–HYM00330, 3 males and 3 females (UFES) (collection permit number: 30259/SISBIO).

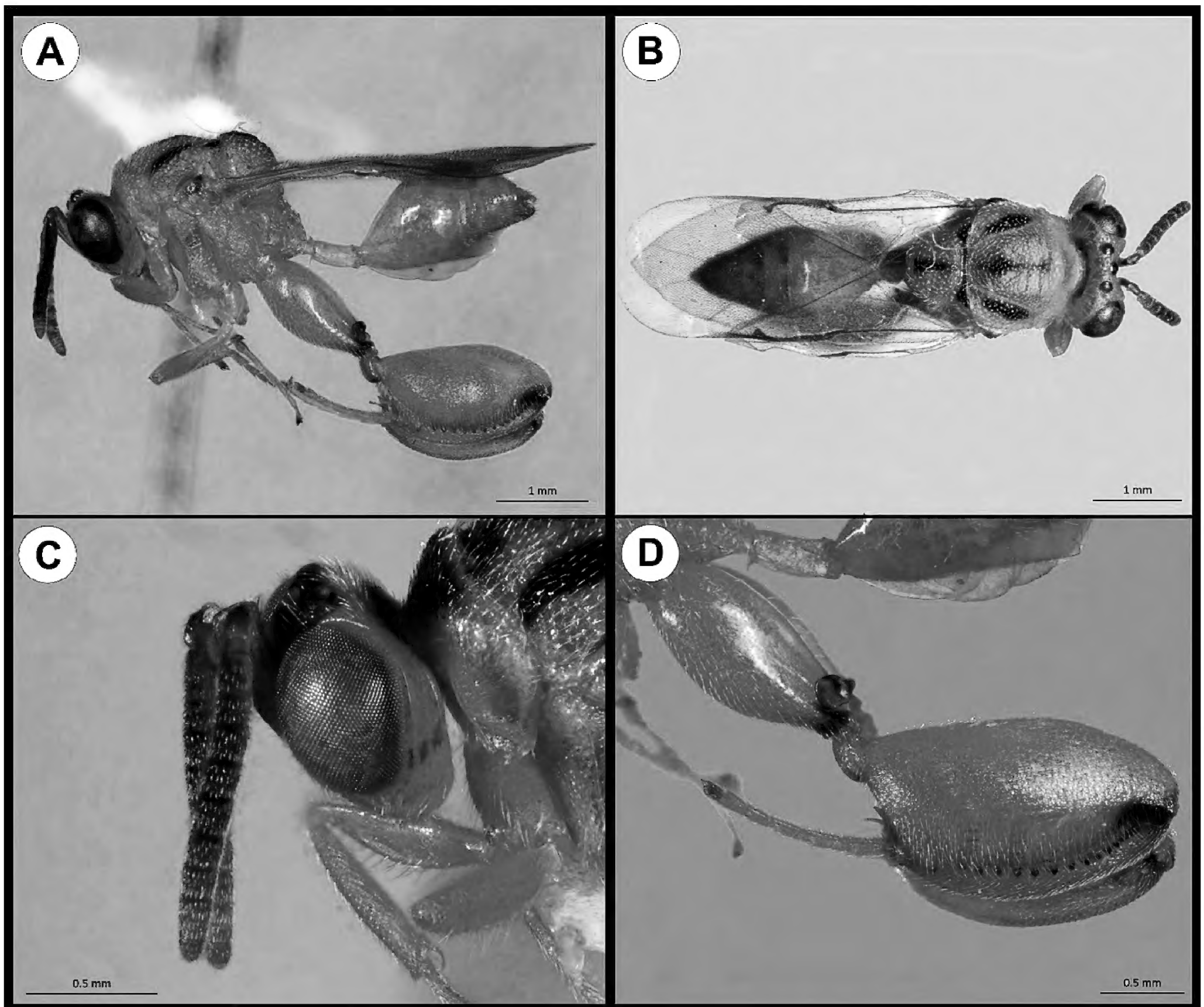


Figure 1. Specimens of *Conura morleyi* collected in Campo Grande, MS, Brazil. **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Head, lateral view. **D.** Hind leg, posterior view.

We identified the parasitoids using the keys by Ashmead (1904), Boucek (1992), and Delvare and Arias-Penna (2006). We confirmed our identification with the original description of the species (Ashmead 1904), and it was later confirmed by a specialist, Dr. Marcelo Tavares from UFES.

Conura morleyi can be segregated from their congeners by the following combination of characteristics: middle mesothoracic lobe with a club-shaped central black spot connected by a black line across the anterior margin that does not reach the base of scutellum; presence of a black line on lateral mesothoracic lobes; scutellum with a club-shaped central black spot connected by a transversal line at base; presence of a minute spot in mesopleural furrow; hind coxae and femora with apical spots; hind femora with 17–18 minute spines on ventral surface; short ovate or subglobose abdomen, petiole more than three times as long as is wide with black spots or bands on dorsal surface (Ashmead 1904).

After four days in the laboratory, 54 specimens of *C. morleyi* emerged from the host pupae (Figure 1). The specimens were preserved in 70% alcohol whilst the host pupae were preserved in dry conditions. The emergence of adults occurred at the end of the dry season and beginning of the rainy season.

This is the first record of *C. morleyi* in state the Mato Grosso do Sul and extends the geographic distribution of the species. According to Noyes (2016), *C. morleyi* is represented in the following countries: Argentina, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guyana, Paraguay, and Trinidad and Tobago (Figure 2A). In Brazil, the species was previously recorded from the states of Alagoas, Bahia, Rio Grande do Sul, and São Paulo (De Santis 1980; Ruszczyk and Ribeiro 1998; Salgado-Neto and Lopes da Silva 2011) (Figure 2B).

Among *Conura* species, *C. maculata* was recorded parasitizing species of *Brassolis* in the Brazilian states of

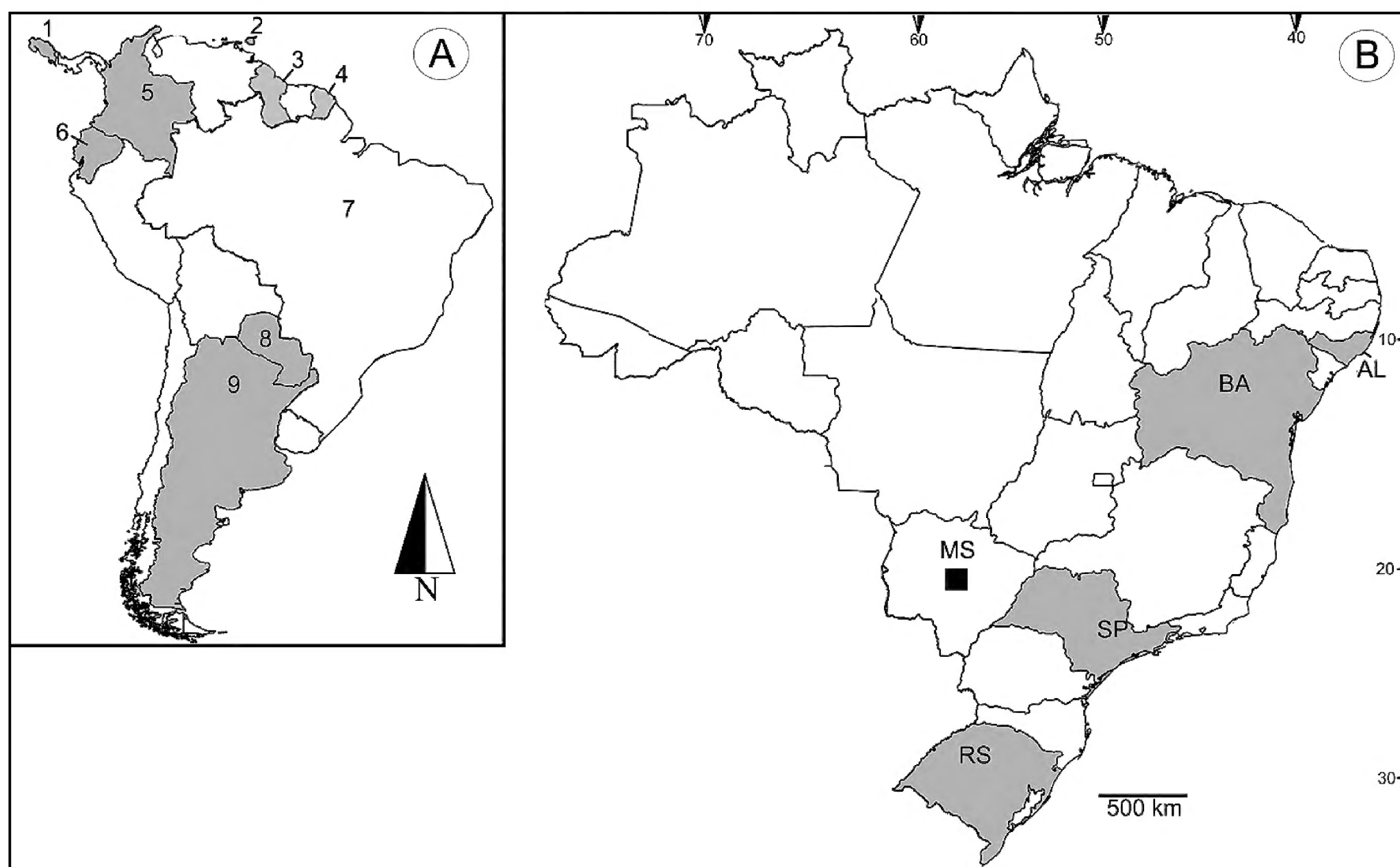


Figure 2. Geographic distribution of *Conura morleyi* in South America (A); and Brazil (B). Square (■): new record from Brazil. Countries: 1: Costa Rica; 2: Trinidad & Tobago; 3: Guyana; 4: French Guiana; 5: Colombia; 6: Ecuador; 7: Brazil (AL: Alagoas, BA: Bahia, SP: São Paulo, RS: Rio Grande do Sul, MS: Mato Grosso do Sul); 8: Paraguay; 9: Argentina.

Pará and Rio Grande do Sul (Sakazaki et al. 2011; Salgado Neto and Lopes da Silva 2011).

Brassolis comprises the species *B. astyra* (Bates, 1864), *B. haenschi* (Stichel, 1902), *B. isthmia* (Bates, 1864), and *B. sophorae* (Linnaeus, 1758) and is distributed in the Neotropics (Gallo et al. 2002). This genus has been reported to occur in Argentina, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Guyana, French Guiana, Panama, Paraguay, Peru, Trinidad and Tobago, and Venezuela (Mariconi and Zamith 1954; NHML 2015). In Brazil, they were recorded in the states of Amapá, Amazonas, Bahia, Ceará, Distrito Federal, Espírito Santo, Maranhão, Mato Grosso, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo, and Sergipe (Mariconi and Zamith 1954). Due to the emergence of parasitoids, it was not possible to recognize the species of *Brassolis*.

Conura morleyi was recorded parasitizing pupae of *B. sophorae* in the states of Alagoas, Bahia, Pará and São Paulo (De Santis 1980; Marcicano et al 2007; Sakazaki et al. 2011) as well as pupae of *B. astyra* in São Paulo (Sauer 1946); these hosts are associated with the palm *Cocos nucifera* L. (Delvare 1992) and use its leaves as food resource. The distribution of parasitoids is directly correlated with hosts (Mariconi and Zamith, 1954). Because the genus *Brassolis* has not been reported in

Mato Grosso do Sul, it is not possible to determine whether the parasitoid is a natural component of the local fauna or if it is following the host. Our new record of *C. morleyi* points to the lack of surveys of hymenopteran parasitoids in Mato Grosso do Sul and the whole of the Central-West Region of Brazil, and consequently, a little knowledge of the natural distribution patterns of these parasitoids and their host/parasitoid relationship.

ACKNOWLEDGEMENTS

We thank Gabriel Pesqueira da Luz from the Universidade Federal de Mato Grosso do Sul (UFMS) for collecting pupae, and Dr. Marcelo Tavares from the Universidade Federal do Espírito Santo (UFES) for confirmation of the *Conura* species.

LITERATURE CITED

- Arruda, E.C. and G.P. Arruda. 1971. Noções fundamentais sobre algumas pragas de plantas cultivadas no estado de Pernambuco. Imprensa Universitária. Recife: Universidade Federal Rural de Pernambuco. 123 pp.
- Ashmead, W.H. 1904. Classification of the chalcid flies of the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in the South America by Herbert H. Smith. *Memoirs of the Carnegie Museum* 1: 225–551. doi: 10.5962/bhl.title.10341
- Bastos, J.A.M. 1972. Caracterização das principais pragas do Nordeste, especialmente do Ceará. UFC. Fortaleza, Escola de Agronomia da Universidade Federal do Ceará. 58 pp.

- Boucek, Z. 1992. The New World genera of Chalcididae. *Memoirs of the American Entomological Institute* 53: 49–117.
- Couri, M. S., M.T. Tavares and R.R. Stenzel. 2006. Parasitoidism of chalcidid wasps (Hymenoptera, Chalcididae) on *Philornis* sp. (Diptera, Muscidae). *Brazilian Journal of Biology* 66: 553–557. doi: 10.1590/S1519-69842006000300022
- De Santis, L. 1980. Catálogo de los himenópteros brasileños de la serie Parasítica incluyendo Bethyloidea, Editora da Universidade Federal do Paraná. Curitiba, Brazil. 385 pp.
- Delvare, G. 1992. A reclassification of the Chalcidini with a checklist of the New World species. *Memoirs of the American Entomological Institute* 53: 119–466.
- Delvare, G. and D.C. Arias-Penna. 2006. Família Chalcididae; pp. 647–660, in: F. Fernández and M.J. Sharkey (eds.). *Introducción a los Hymenoptera de la región Neotropical*. Bogotá: Sociedad Colombiana de Entomología y Universidad Nacional de Colombia. 660 pp.
- Gallo, D., O. Nakano, S.S. Neto, R.P.L. Carvalho, G.C. Batista, E.B. Filho, J.R.P. Parra, R.A. Zucchi, S.B. Alves, J.D. Vendramim, L.C. Marchini, J.R.S. Lopes and C. Omoto. 2002. *Entomologia agrícola*. Piracicaba, FEALQ. 920 pp.
- IMSA (Iziko Museums of South Africa). [2015]. Accessed at <http://www.waspweb.org/chalcidoidea/Chalcididae/Chalcidinae/Conura>, 3 October 2015.
- Marchiori, C.H., C.G. Silva and A.P. Lobo. 2004. Parasitoids of *Tuta absoluta* (Meyrick, 1917) (Lepidoptera: Gelechiidae) collected on tomato plants in Lavras, state of Minas Gerais, Brazil. *Brazilian Journal of Biology* 64(3A): 551–552. doi: 10.1590/S1519-69842004000300018
- Marcicano, M.D.L., I.M.M. Lima, M.T. Tavares and M.M. Casagrande. 2007. Parasitism of *Brassolis sophorae laurentii* Stichel (Lepidoptera: Nymphalidae, Brassolini) pupae by *Conura morleyi* (Ashmead) (Hymenoptera: Chalcididae, Chalcidini), in the state of Alagoas, Brazil. *Neotropical Entomology* 36(4): 629–631.
- Mariau, D. 2001. The fauna of oil palm and coconut. Insect and mite pests and their natural enemies. Montpellier: La Librairie du CIRAD. 266 pp.
- Mariconi, F.A.M. and A.P.L. Zamith. 1954. Contribuição para o conhecimento da *Brassolis sophorae* (Linnaeus, 1758), *B. astyra* Godart, 1821 (Lepid. – Brassolidae) e de seus inimigos naturais; *Anais da Escola Superior de Agricultura Luiz de Queiroz* 11: 159–222.
- Montes, S.M.N.M. and V.A. Costa. 2011. Parasitismo de huevos de *Paraselenis fava* (Coleoptera: Chrysomelidae) en batata (*Ipomoea batatas*). *Revista Colombiana de Entomología* 37(2): 249–250.
- Noyes, J.S. 2016. Universal Chalcidoidea database. World Wide Web electronic publication. Accessed at <http://www.nhm.ac.uk/chalcidoidea>, 5 September 2016; see also <http://www.nhm.ac.uk/our-science/data/chalcidoidea/citing.html#sthash.6EE4NnTo.dpuf>.
- Ruszczyk, A., and J.C. Ribeiro. 1998. Mortalidade dos parasitoides *Spilochalcis morleyi* (Hymenoptera, Chalcididae) e *Xanthozona melanopyga* (Diptera, Tachinidae) em pupas femininas e masculinas de *Brassolis sophorae* (Lepidoptera, Nymphalidae). *Revista Brasileira de Biologia* 58: 633–637.
- Sakazaki, A. Y., R.C. Ribeiro, R.S. Tinôco, W. de P. Lemos and J.C. Zanuncio. 2011. Registro de espécies de *Conura* spp., parasitoides e hiperparasitoides em insetos praga em cultivos da palma do óleo na região Amazônica. *Anais de resumos expandidos/III Simpósio Brasileiro de Agropecuária Sustentável, Viçosa, Minas Gerais*. 429–431.
- Salgado-Neto, G. and M. Lopes da Silva. 2011. First report of parasitism on pupae of *Opsiphanes invirae amplifatus* Stichel (Lepidoptera, Nymphalidae) by *Conura* (*Conura*) *maculata* (Fabricius) (Hymenoptera, Chalcididae) in Rio Grande do Sul, Brazil. *Revista Brasileira de Entomologia* 55(2): 85–286. doi: 10.1590/S0085-56262011005000016
- Sauer, H.F.G. 1946. Constatação de Himenópteros e Dípteros entomófagos no Estado de São Paulo. *Boletim Fitossanitário* 3(1): 7–23.
- Shimbori, E.M., H.C. Onodi, D.R.R. Fernandes, R. Silvestre, M.T. Tavares and A.M. Penteado-Dias. [In Press]. Hymenoptera “Parasítica” in the state of Mato Grosso do Sul, Brazil. *Iheringia, Série Zoologia*.

Author contributions: MT and RA identified the specimens; MA photographed the specimens; RA produced the figures and map; MT, RA and RLM wrote the text.

Received: 10 December 2015

Accepted: 6 October 2016

Academic editor: Filippo Di Giovanni